| NEW YORK STATE OF OPPORTUNITY. Department of Transportation Office of Structures | TECHNICAL ADVISORY | TA 22-001 |
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**Title**: **Load Rating and Load Posting of State-Owned Bridges for the Emergency Vehicles EV2 and EV3 Based on Load Factor Rating (LFR) Method**

| **Issued By:** | **Approved By:** |
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| Office of Structures<br>Structure Management Bureau |  5-23-22 |
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## INTRODUCTION

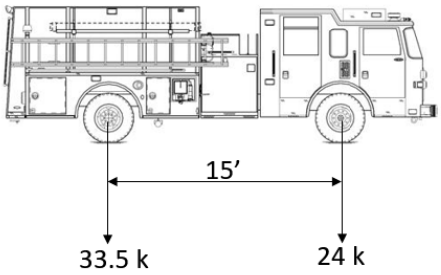
The Fixing America's Surface Transportation Act (FAST Act) (Pub. L. 114-94) has made Emergency Vehicles legal on the Interstate and within reasonable access to the Interstate. These vehicles exceed the legal weight limits of New York State and would require permits on any other highways. NYSDOT has adopted one-road-mile as a reasonable access to the Interstate.

An emergency vehicle as defined in the FAST Act is a vehicle that is to be used under emergency conditions to transport personnel and equipment to support the suppression of fires and mitigation of other hazardous situations (23 U.S.C. 127(r)(2)). The gross vehicle weight limit for emergency vehicles is 86,000 pounds under section 127(r). The statute imposes the following additional limits, depending upon vehicle configuration:

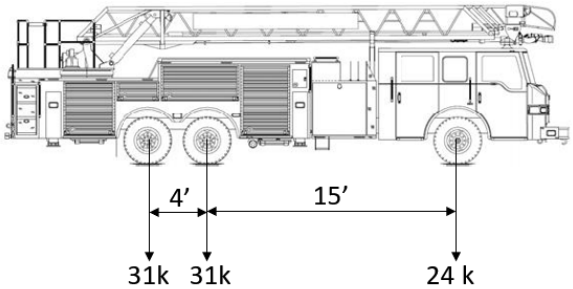
- 24,000 pounds on a single steering axle
- 33,500 pounds on a single drive axle
- 62,000 pounds on a tandem axle
- 52,000 pounds on a tandem rear drive steer axle

Emergency vehicles are typically operated by fire departments and are primarily equipped for firefighting but are also used to respond to and mitigate other hazardous situations in an emergency. These vehicles may not meet Federal Bridge Formula B. They can create higher load effects compared to the AASHTO legal loads (i.e., Types 3, 3S2, 3-3, and SU4 to SU7) which are currently included in the AASHTO Manual for Bridge Evaluation (MBE). The Federal Highway Administration (FHWA) has determined that, for the purpose of load rating, two emergency vehicle configurations; EV2 and EV3 shown below produce load effects in typical bridges that envelop the effects resulting from the family of typical emergency vehicles covered by the FAST Act.

**EV2 (GVW 57.5 kips)**




**EV3 (GVW 86 kips)**




This TA provides guidance for load rating and load posting of State-owned bridges for emergency vehicles EV2 and EV3 based on Load Factor Rating (LFR) method.

## REQUIREMENTS

The following requirements should be followed when performing load ratings for EV2 and EV3:

1. Multiple presence: Use the SU-7 legal load as side-by-side vehicle and the AASHTO LRFD equation 4.6.2.2.5-1 when using line girder analysis; with Z = 1.0 for LFR. Even though this is described in the LRFD code, it is an application of superposition of loads and is valid for LFR as well.

2. Live load factor: Use a live load factor of 1.3. (Operating rating)

3. Use the latest MBE.

4. Controlling strength limit should be used for posting.

## PROCEDURE

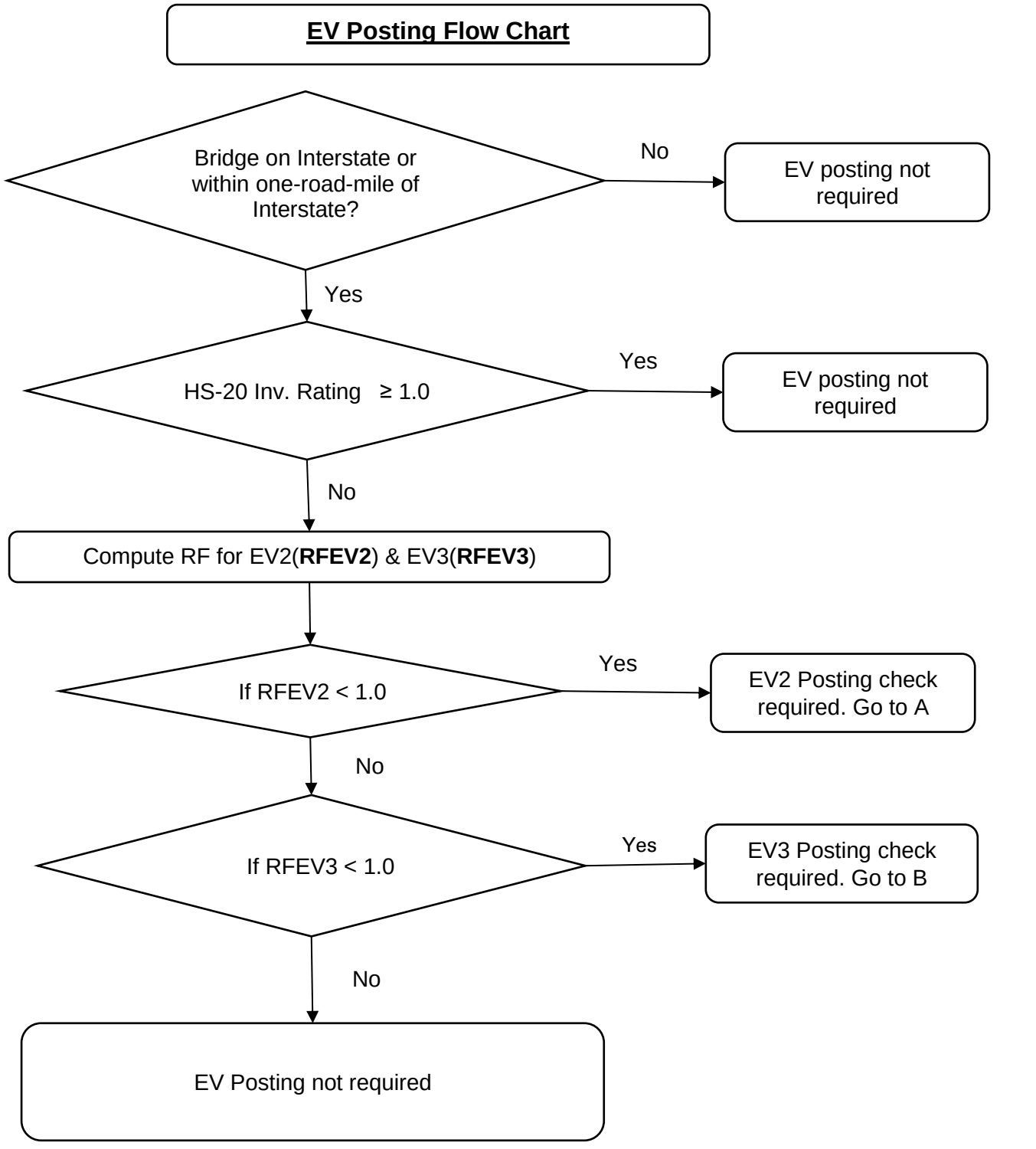
- Check legal load posting based on EI 20-026. The controlling posting for the bridge will be the lower posting of legal loads or the EVs as described below.

- Load rating for the emergency vehicles (EVs) is required only for Interstate bridges and bridges within one-road-mile from an Interstate.

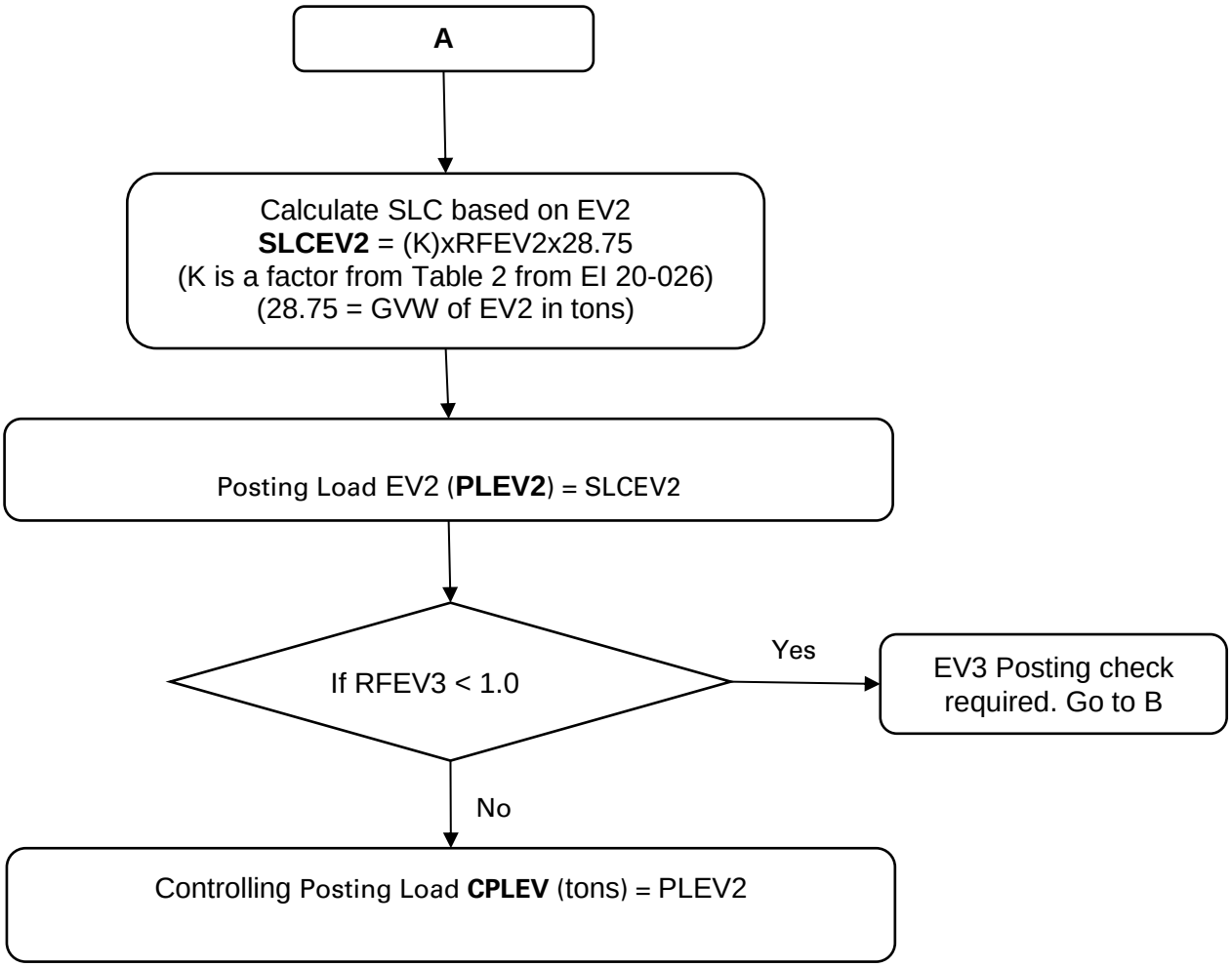
- If the HS-20 Inventory Rating ≥ 1.0; then EV rating is not required

- For EV3 posting, use safe load modification factors (MDFEV3) of 1.15 for single-lane, and 1.4 for multi-lane bridges. No safe load modification is used when posting for EV2.

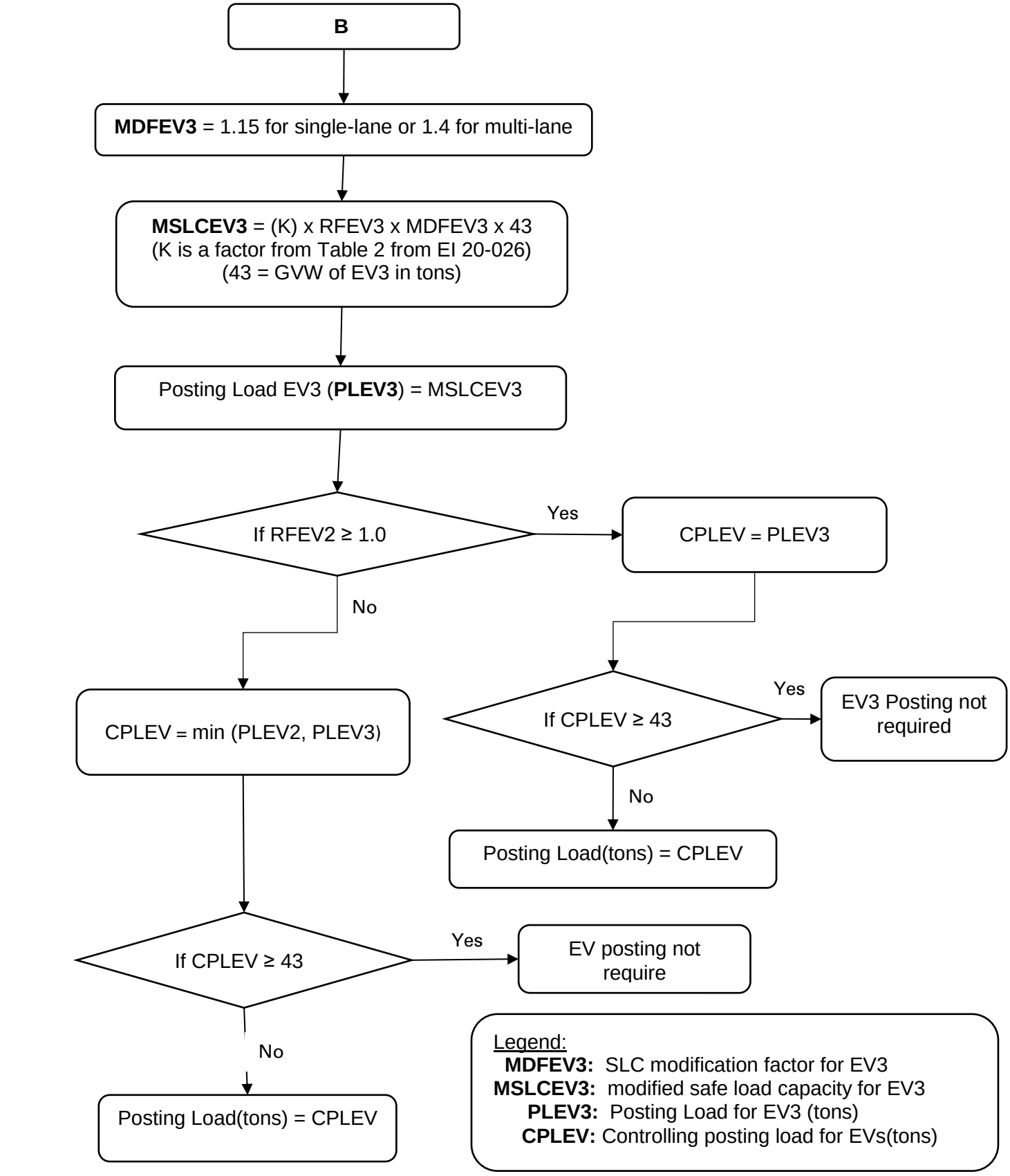
- For EV3, posting will not be required if the posting load based on the modified safe load capacity is greater than or equal to the gross weight of EV3 = 43 tons.




Legend:
**RFEV2:** Rating factor for EV2
**RFEV3:** Rating factor for EV3




Legend:
**SLCEV2:** Safe Load Capacity for EV2(tons)
**PLEV2:** Posting Load for EV2 (tons)
**CPLEV:** Controlling posting load for EVs(tons)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MDFEV3 = 1.15 for single-lane or 1.4 for multi-lane
MSLCEV3 = (K) x RFEV3 x MDFEV3 x 43
(K is a factor from Table 2 from EI 20-026)
(43 = GVW of EV3 in tons)
Posting Load EV3 (PLEV3) = MSLCEV3
If RFEV2 ≥ 1.0
Yes
CPLEV = PLEV3
No
CPLEV = min (PLEV2, PLEV3)
If CPLEV ≥ 43
Yes
EV3 Posting not required
No
Posting Load(tons) = CPLEV
If CPLEV ≥ 43
Yes
EV posting not require
No
Posting Load(tons) = CPLEV
Legend:
MDFEV3: SLC modification factor for EV3
MSLCEV3: modified safe load capacity for EV3
PLEV3: Posting Load for EV3 (tons)
CPLEV: Controlling posting load for EVs(tons)

## POSTING SIGNS

NYSDOT currently uses the single tonnage posting signs as described in MUTCD and NYS supplements.

## REFERENCES

- EI 20-026
- FHWA's Memorandum on Load Rating for the FAST Act's Emergency Vehicles dated November 3, 2016.
- FHWA's Q and A on Load Rating for the Fast Act's Emergency Vehicles revision R01 dated March 16, 2018

**Examples:** Assume multi-lane bridge on the Interstate and HS-20 Inventory RF < 1.0.

**Example 1**: Rating Factor for EV2 (RFEV2) = 0.82 and Rating Factor for EV3 (RFEV3) = 1.12.

RFEV2 = 0.82 < 1.0; EV2 posting check is required. Go to A in the flow chart.

Assume K = 0.85; SLC for EV2 (SLCEV2) = K x RFEV2 x 28.75 = 0.85 x 0.82 x 28.75 = 20.04 tons

Posting Load for EV2 (PLEV2) = SLCEV2 = 20 tons (truncated)

RFEV3 = 1.12 > 1.0; therefore, EV3 posting is not required; posting is controlled by EV2.
Bridge should be posted for the lower of 20 tons, or Legal load Posting (if required).

**Example 2:** Rating Factor for EV2 (RFEV2) = 0.8 and Rating Factor for EV3 (RFEV3) = 0.7.

RFEV2 = 0.8 < 1.0; EV2 posting check required, Go to A in the flow chart.

Assume K = 0.85; SLC for EV2 (SLCEV2) = K x RFEV2 x 28.75 = 0.85 x 0.8 x 28.75 = 19.55 tons

Posting Load for EV2 (PLEV2) = SLCEV2 = 19.55 tons

RFEV3 = 0.7 < 1.0; EV3 posting check is required. Go to B in the flow chart.

Since the bridge is multi-lane; modification factor for EV3 (MDFEV3) = 1.4

Modified SLC for EV3 (MSLCEV3) = K x RFEV3 x MDFEV3 x 43 = 0.85 x 0.7 x 1.4 x 43 = 35.82 tons

Posting Load for EV3 (PLEV3) = MSLCEV3 = 35.82 tons < 43.0 tons

Controlling posting for EVs = Min (PLEV2, PLEV3) = Min (19.55; 35.82) = 19 tons (truncated)

Bridge should be posted for the lower of 19 tons, or Legal load posting (if required)